

What is claimed is:

1. An isolated *Dirofilaria immitis* nucleic acid molecule, wherein said *Dirofilaria immitis* nucleic acid molecule hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10.

2. The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule is selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10.

3. The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule comprises a nucleic acid sequence that is at least 85% identical to a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10, wherein determination of percent identity between molecules is made by a DNAsis™ computer program, using default parameters.

4. The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule encodes a protein comprising an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9.

20 5. A recombinant molecule comprising a nucleic acid molecule as set forth in Claim 1 operatively linked to a transcription control sequence.

6. A recombinant virus comprising a nucleic acid molecule as set forth in
Claim 1.
7. A recombinant cell comprising a nucleic acid molecule as set forth in
Claim 1.
- 5 8. A method to produce a protein encoded by a nucleic acid molecule as set
forth in Claim 1, said method comprising culturing a cell transformed with a nucleic acid
molecule encoding said protein.

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9. An isolated nucleic acid molecule selected from the group consisting of:

(a) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:16, and SEQ ID NO:18; and (b) an isolated *Dirofilaria immitis* nucleic acid molecule comprising a homologue of any of said nucleic acid molecules of (a), or a complement of any of said homologues, wherein said homologue encodes a protein that elicits an immune response against a protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a 50 contiguous nucleotide portion identical in sequence to a 50 contiguous nucleotide portion of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10.

10. A recombinant molecule comprising a nucleic acid molecule as set forth in
Claim 9 operatively linked to a transcription control sequence.

15 11. A recombinant cell comprising a nucleic acid molecule as set forth in
Claim 9.

12. An isolated *Dirofilaria immitis* protein, wherein said *Dirofilaria immitis* protein is encoded by a nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and SEQ ID NO:10.

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13. The protein of Claim 12, wherein said protein comprises an amino acid sequence that is at least about 95% identical to an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, wherein determination of percent identity between molecules is made by a DNAsis™ computer program, using default parameters.

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14. The protein of Claim 12, wherein said protein is encoded by a nucleic acid molecule having a nucleic acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and SEQ ID NO:10.

15. The protein of Claim 12, wherein said protein comprises an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9.

16. An isolated antibody that selectively binds to a protein as set forth in Claim 12.

17. A method to identify a compound capable of inhibiting filariid cuticlin activity, said method comprising contacting an isolated *Dirofilaria immitis* cuticlin protein as set forth in Claim 12, with a putative inhibitory compound under conditions in which, in the absence of said compound, said protein has cuticlin activity, and determining if said putative inhibitory compound inhibits said activity.

18. A therapeutic composition that, when administered to a host animal,
inhibits molting of filariid larvae, said therapeutic composition comprising: an excipient;
and a protective compound selected from the group consisting of: (a) an isolated
Dirofilaria immitis protein encoded by a nucleic acid molecule that hybridizes in a
5 solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing
in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence
selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and
SEQ ID NO:10; (b) an isolated protein selected from the group consisting of (i) a protein
comprising an amino acid sequence selected from the group consisting of SEQ ID NO:4,
SEQ ID NO:9, and SEQ ID NO:17, and (ii) an isolated *Dirofilaria immitis* protein
comprising a homologue of a protein of (i), wherein said homologue comprises at least
one epitope that elicits an immune response against a protein selected from the group
consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a
15 contiguous amino acid portion identical in sequence to a 15 contiguous amino acid
portion of a sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID
10 NO:9; (c) an isolated *Dirofilaria immitis* nucleic acid molecule that hybridizes in a
solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing
in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence
selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ
15 ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10; (d) an
isolated nucleic acid molecule selected from the group consisting of (i) an isolated
nucleic acid molecule comprising a nucleic acid sequence selected from the group
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consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:16, and SEQ ID NO:18, and

(ii) an isolated *Dirofilaria immitis* nucleic acid molecule comprising a homologue of any of said nucleic acid molecules of (i), or a complement of any of said homologues,

wherein said homologue encodes a protein that elicits an immune response against a

protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and

wherein said homologue has at least a 50 contiguous nucleotide portion identical in

sequence to a 50 contiguous nucleotide portion of a sequence selected from the group

consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6,

SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10; (e) an isolated antibody that selectively

binds to a protein having an amino acid sequence selected from the group consisting of

SEQ ID NO:4 and SEQ ID NO:9, and (i) an inhibitor of filarial cuticulin activity identified

by its ability to inhibit the activity of a maize calcium protein having an amino acid

sequence selected from the group consisting of SEQ ID NO.4 and SEQ ID NO.5.

19. The composition of Team 16, which had competition in

20. A method to inhibit molting of filariid larvae in an animal, said method comprising administering to said animal a composition comprising a protective compound selected from the group consisting of:(a) an isolated *Dirofilaria immitis* protein encoded by a nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and SEQ ID NO:10; (b) an isolated protein selected from the group consisting of (i) a protein comprising an amino acid sequence selected from the group consisting of SEQ ID NO:4, SEQ ID NO:9, and SEQ ID NO:17, and (ii) an isolated *Dirofilaria immitis* protein comprising a homologue of a protein of (i), wherein said homologue comprises at least one epitope that elicits an immune response against a protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a 15 contiguous amino acid portion identical in sequence to a 15 contiguous amino acid portion of a sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9; (c) an isolated *Dirofilaria immitis* nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10; (d) an isolated nucleic acid molecule selected from the group consisting of (i) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID

NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:16, and SEQ ID NO:18, and (ii) an isolated *Dirofilaria immitis* nucleic acid molecule comprising a homologue of any of said nucleic acid molecules of (i), or a complement of any of said homologues, wherein said homologue encodes a protein that elicits an immune response against a protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a 50 contiguous nucleotide portion identical in sequence to a 50 contiguous nucleotide portion of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10; (e) an isolated antibody that selectively binds to a protein having an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9; and (f) an inhibitor of filariid cuticlin activity identified by its ability to inhibit the activity of a filariid cuticlin protein having an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9.

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